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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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*Ex parte* VANESSA Z.H. CHAN, EDWIN L. THOMAS, VICTORY Y. LEE, ROBERT D. MILLER, APOSTOLOS AVGEROPOULOS, and NIKOS HADJICHRISTIDIS

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Appeal 2009-009476
Application 09/720,710
Technology Center 1700

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Decided: March 31, 2010

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Before MICHAEL P. COLAIANNI, BEVERLY A. FRANKLIN, and LINDA M. GAUDETTE, *Administrative Patent Judges*.

COLAIANNI, *Administrative Patent Judge*.

## STATEMENT OF CASE

This is a decision on an appeal under 35 U.S.C. § 134 from the Examiner's final rejection of claims 1, 17, 23, and 24. Claims 2 through 16, 18 through 22, and 25 through 148, the other claims pending in this application, stand withdrawn from consideration by the Examiner. We have jurisdiction under 35 U.S.C. § 6.

We REVERSE.

The Examiner maintains the following rejections: (1) claims 1, 17, and 23 under 35 U.S.C. § 102(b) over Lee[1]; and (2) claim 24 under 35 U.S.C. § 102(b) or, in the alternative, under 35 U.S.C. § 103(a) over Lee.

## ISSUE

Did the Examiner err in finding that Lee discloses a system having a three dimensionally periodic structure and at least a first and second domain each being topologically continuous as required by claim 1? We decide this issue in the affirmative.

## FINDINGS OF FACT (FF)

1. The Specification states that

> a "three-dimensionally" periodic structure refers to a structure which can be oriented in the three dimensional coordinate system so that straight lines in all three component directions may pass through the structure and intersect at regular intervals at least two separate domains. Furthermore, the term "periodic structure" as used herein refers to those articles with domain structures having regular periodicity as characterized by like domains having similar characteristic dimensions and spacing within the article.

(Spec. p. 12, ll. 10-15).

2. The Specification states that "'topologically continuous' means continuous, in the sense that a particular domain in a periodic, polymeric structure forms a continuous pathway through the structure." (Spec. p. 12, ll. 10-15).

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[1] Lee et al., "Polymerization of Monomers Containing Functional Silyl Groups. 7. Porous Membranes with Controlled Microstructures," *American Chemical Society*, 2602-2606 (1989) (Hereinafter "Lee").

3. The Specification states that "[a] 'one-dimensionally' periodic structure refers to a structure which can be oriented in the three dimensional coordinate system . . . so that a straight line in only one component direction will pass through the structure and intersect at regular intervals at least two separate domains." (Spec. 12, ll. 3-6). In this regard, the Specification discloses that a one-dimensionally periodic structure may be a lamellar structure. (Spec. p. 23, ll. 17-18).
4. The Specification states that "[a] 'two-dimensionally' periodic structure refers to a structure which can be oriented in the three dimensional coordinate system so that straight lines in only two component directions will passes through the structure and intersect at regular intervals at least two separate domains." (Spec. 12, ll. 6-9). In this regard, the Specification discloses that a two-dimensionally periodic structure may be an array of cylinders on a substrate. (Spec. p. 23, ll. 17-20 and p. 38, l. 18-19; *see also* Fig. 3).

## ANALYSES AND CONCLUSIONS

With respect to rejection (1), Appellants argue that "Lee cannot anticipate claim 1 because it does not disclose a polymeric structure comprising both (1) a 'three-dimensionally periodic structure,' and (2) a plurality of periodically occurring separate domains, with at least a first and a second domain each being 'topologically continuous,' as required by claim 1." (App. Br. 8). We agree.

The Examiner states that "block copolymers I and II forms [sic] microporous membranes with a three-dimensionally periodic structure and their hollow domains are topologically continuous throughout the membrane structure." (Ans. 3). In addition, the Examiner states that "Lee teaches various periodic structures, including the three-dimensionally periodic structures of spherical domains, which is commensurate with Lee's teaching of the periodicities of the microporous membrane in Table V." (Ans. 5). In addition, the Examiner states that

> Regarding the term "topologically continuous", since Lee teaches that 1) the poly(4-vinylpheny1)dimethyl-2- propoxysilane domain, the poly(isoprene) block is decomposed to form a continuous hollow domain through the membrane, 2) the SEM of the cross-section of the membrane shows the continuous structure of micropores through the membrane, and 3) the membrane has periodic microporous structure, the examiner asserts that Lee teaches the structural features as claimed.

(Ans. 5). While it is true that Lee states in its Abstract section of its disclosure that porous membranes are formed by decomposing polyisoprene blocks with ozone such that "the hollow . . . domain is continuous," Lee also teaches at pages 2604 through 2606 that these membranes correspond to membranes I, II, IV, and V formed from block copolymers I, II, IV, and V, respectively, that have been subjected to ozonolysis.

In this regard, with respect to membranes I, II, and IV, while Lee teaches in its Table V (p. 2606) that each of its membranes I, II, and IV formed from block copolymers I, II, and IV, respectively, has a "continuous channel through the membrane" (topologically continuous), the Examiner fails to direct us to any credible teaching in Lee that any of these membranes

forms a three-dimensionally periodic structure *and* has at least two domains being topologically continuous as required by claim 1.

Indeed, contrary to the Examiner's statement, Lee teaches that its SEM image shows that each of its membranes I and II, which are made from block copolymers I and II, has a *lamellar* structure, which corresponds to a one-dimensional periodic structure, and not a three-dimensionally periodic structure as required by claim 1. (Lee, p. 2605; *see also* FF 3). In addition, since each of Lee's membranes I and II has a one-dimensional periodic structure, the continuous channel (topologically continuous) of each membrane can be in only one domain and not in at least two domains as required by claim 1.

Similarly, Lee teaches that its SEM image shows that membrane IV, which is made from block copolymer IV, having "*[c]ylindrical* hollows . . . in . . . [its] cross-section," which corresponds to a two-dimensional periodic structure and not a three dimensionally periodic structure as required by claim 1. (Lee, p. 2606) (emphasis added) (*see also* FF 4).

Thus, as correctly stated by Appellants, since these membranes I, II and IV exhibit either "lamellar or cylindrical structures, they are not three-dimensionally periodic." (Reply Br. 5). Moreover, because each of Lee's membranes I and II has a lamellar structure (i.e., one-dimensional periodic structure), the continuous channel (topologically continuous) of each membrane can be in only one domain and not in at least two domains as required by claim 1.

With respect to Lee's membrane V, while Appellants acknowledge (Reply Br. 5) that Lee's block copolymer V exhibits a three-dimensionally

periodic structure, the Examiner fails to direct us to any credible teaching in Lee that this block copolymer or membrane V made from block copolymer V has at least two domains being topologically continuous as required by claim 1. Indeed, Lee teaches that its Table V shows that the membrane made from block copolymer V has a "*closed* hollow domain." (Lee, p. 2606) (emphasis added). It is unclear to us how either block copolymer V or membrane V can be topologically continuous when Lee expressly teaches that block copolymer V has a closed, hollow domain.

Thus, it follows that the Examiner erred in finding that Lee discloses a system having a three dimensionally periodic structure and at least a first and second domain each being topologically continuous as required by claim 1.

With respect to rejection (2), because the Examiner relies on, *inter alia*, the same findings discussed above and does not provide any reason to modify Lee to meet at the disputed claim features, we reverse both of the Examiner's §§ 102 and 103 rejections of claim 24.

ORDER

In summary, all of the rejections are reversed.

Accordingly, the decision of the Examiner is reversed.

REVERSED

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